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PATENT APPLICATION  
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IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Ronald D. Larson

Confirmation No.: 9221

Application No.: 09/172,389

Examiner: Nguyen, K.

Filing Date: 10/14/98

Group Art Unit: 2671

Title: A Method and Apparatus for Updating a Hierarchical Z Buffer

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TRANSMITTAL OF REPLY BRIEF

Sir:

Transmitted herewith in **triplicate** is the Reply Brief with respect to the Examiner's Answer mailed on 12/17/01. This Reply Brief is being filed pursuant to 37 CFR 1.193(b) within two months of the date of the Examiner's Answer.

(Note: Extensions of time are not allowed under 37 CFR 1.136(a))

(Note: Failure to file a Reply Brief will result in dismissal of the Appeal as to the claims made subject to an expressly stated new grounds of rejection.)

No fee is required for filing of this Reply Brief.

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Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

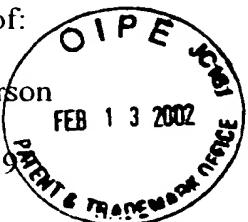
In re the application of:

Ronald D. Larson

Serial No.: 09/172,389

Filed: October 14, 1998

For: **A Method and Apparatus for  
Updating a Hierarchical Z Buffer**



) Art Unit: 2671

) Examiner: Nguyen, K.

) HP Docket No.: 10981013-1  
TKHR Docket No.: 50814-1040

REPLY BRIEF UNDER 37 CFR 1.193

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Honorable Commissioner of Patents and Trademarks  
Washington, D. C. 20231

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Sir:

Appellant submits the following Reply Brief in triplicate. This Reply Brief is submitted in response to the Examiner's Answer (Paper No. 14), dated December 17, 2001. This Reply Brief is filed pursuant to 37 C.F.R. § 1.193(b)(1) within two months of the Examiner's Answer.

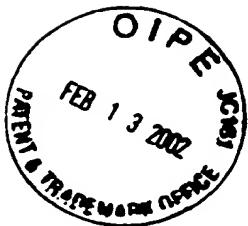
It is not believed that an extension of time is necessary under 37 C.F.R. § 1.136(a). It is further believed that no fee is required for filing this Reply Brief. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required therefor are hereby authorized to be charged to Hewlett Packard Company's Deposit Account No. 08-2025.

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REMARKS

Appellant respectfully points out the following errors set forth in the Examiner's

Answer. First, Appellant respectfully submits that the Examiner's Answer raises a new ground for rejecting the claims by alleging that the specification does not describe adequate structure, material or acts for performing the recited function. Not only is the new ground introduced after the Final Office Action on the merits, which makes the assertion untimely under M.P.E.P. § 706.03, the allegation is overly broad as it is not made with the specificity suggested under the same section of the M.P.E.P., and contrary to the Examiner's assertion, the specification and figures disclose the necessary structure and steps to enable pending claims 1, 4-11, and 14-18.

Second, Appellant respectfully submits that *Greene et al.* (U.S. Patent No. 5,579,455) in view of *Sudarsky et al.* (U.S. Patent No. 6,088,035), contrary to the assertion in the Examiner's Answer, does not teach, suggest, or disclose all of the elements of independent claims 1, 11, and 18. In this regard, Appellant respectfully submits that the argument set forth in the Examiner's Answer omits at least the emphasized claim language as argued in the Appeal Brief. Consequently, the Examiner's Answer misstates the Appellant's complete position on the matter.

Third, contrary to the assertion in the Examiner's Answer, the Final Office Action as well as the argument in the Examiner's Answer fails to establish a *prima facie* case of obviousness. For at least these reasons and the reasons argued in the Appeal Brief, Appellant submits that the specification and figures are in order and pending claims 1, 4-11, and 14-18 are patentable over the cited references. Consequently, Appellant requests that the Board of Patent Appeals and Interferences overturn the rejection of claims 1, 4-11, and 14-18.

## ISSUES

Concerning the issues raised upon appeal, the Examiner's Answer (Page 2, paragraph 6) indicates that the appellant's statement of the issues in the Appeal Brief is correct. However, in the first sentence of the last page of the Examiner's Response to Argument, the Examiner raises new grounds for rejecting the pending claims. More specifically, the Examiner alleges for the first time that the specification does not describe adequate structure, material or acts for performing the recited function.

## REPLY TO NEW ISSUE RAISED IN THE EXAMINER'S ANSWER

The Examiner's Answer alleges that the specification does not describe adequate structure, material, or acts for performing the recited function. Appellant respectfully traverses the new allegation. First, Appellant cites the timing of the Examiner's conclusion that the specification does not describe adequate structure, material, or acts for performing the recited function. Second, the Examiner's allegation fails to apply the statutory requirements recited in 35 U.S.C. § 112, first paragraph. Third, Appellant submits that the Examiner's allegation is overly broad in that it fails to address specific recited functions that the Examiner believes cannot be performed by the structures, material or acts in the specification.

Concerning the timing of the Examiner's allegation, Appellant submits that 37 C.F.R. § 1.193(a)(2) forbids a new grounds of rejection in an Examiner's Answer. In this regard, M.P.E.P. § 706.03(c) indicates that appropriate times to enter a rejection under 35 U.S.C. § 112, paragraph one are upon first actions on the merits and final rejections. In the present application, the Examiner raises the issue of enablement just prior to the Examiner's summary statement in the Examiner's Answer to the Appeal Brief. The Examiner's introduction of this new ground for rejection after a Final Office Action on the merits is

untimely. Consequently, for at least this reason, Appellant submits that the Examiner's allegation is improper. Thus, for at least this reason, Appellant submits that the Examiner's allegation of non-enablement should be overturned.

Regarding the nature of the Examiner's allegation, Appellant submits that the allegation is recited in a conclusory manner without support. More specifically, the allegation is as follows, "the specification does not describe adequate structure, material or acts for performing the recited function." M.P.E.P. § 706.03(c) indicates that an appropriate rejection should include a statement identifying the claimed subject matter for which the specification is not enabling along with an explanation as to why the specification is not enabling. The explanation should include any questions the examiner may have asked which were not satisfactorily resolved and consequently raise doubt as to enablement. Because the quoted allegation above stands alone without specifying the claimed subject matter for which the specification is allegedly not enabling, Appellant submits that the Examiner's allegation is improper. Thus, for at least this reason, Appellant submits that the Examiner's allegation of non-enablement should be overturned.

Concerning the breadth of the Examiner's allegation that the specification does not enable the recited function, Appellant submits that specification, as filed, contains a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same. Furthermore, Appellant submits that the specification contains a description of the best mode contemplated for implementing the invention. *See* 35 U.S.C. § 112, first paragraph.

In this regard, Appellant's independent claim 1 is directed to an apparatus for occlusion testing primitives being processed in a graphics system. Appellant's independent claim 11 is directed to a method for occlusion testing primitives in a graphics system.

Appellant's independent claim 18 recites an apparatus for occlusion testing primitives being processed in a graphics system in means plus function format. Appellant's dependent claims 4-10 and 14-17 depend from independent claims 1 and 11, respectively.

Concerning claims 1 and 18, Figures 2 and 3 along with the related detailed description on pages 5-7 discloses a computer graphics processing system. As shown in the figures and described in the specification, the graphics processing system clearly includes a host interface unit (HIU), two-dimensional and three-dimensional macro function units (MFUs), an object function unit (OFU), a frame buffer controller (FBC) that includes a memory controller (MC) and a random access memory (RAM). As further disclosed in the specification, the three-dimensional MFU contains a setup unit, a hierarchical tiler, a parameter interpolator, a pixel Z-value comparison unit, a Z-pyramid memory, and a pixel-level Z-buffer memory. Moreover, the description of the figures clearly recites that Fig. 3 is a block diagram of the macro-function unit of the graphics system shown in Fig. 2 in accordance with the preferred embodiment of the present invention.

Concerning the method of claim 11, pages 7-12 of the specification and the remaining figures support the recited method steps. More specifically, Figures 4A-4D illustrate different levels of the Z pyramid used for occlusion testing by the macro-function unit shown in Figure 3. Figures 5A-5C correspond to coverage masks used for updating the Z-pyramid levels illustrated in Figures 4A-4C. Lastly, Figures 6-8 contain flow diagrams clearly illustrating the method of the present invention for performing occlusion testing and for updating the Z pyramid on the fly.

Because the claimed subject matter appears in the figures and is described in detail in the specification as argued above, Appellant submits that the specification meets the requirements set forth in 35 U.S.C. § 112, first paragraph. Consequently, the Examiner's

allegation is unfounded. Thus, for at least this reason, Appellant submits that the Examiner's allegation of non-enablement should be overturned.

#### **REPLY TO THE ARGUMENTS IN THE EXAMINER'S ANSWER**

The Examiner's Answer maintained the rejection to claims 1, 4-7, 9-11, and 14-18 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent Number 5,579,455 to *Greene et al.* (hereinafter, *Greene et al.*) in view of U.S. Patent Number 6,088,035 to *Sudarsky et al.* (hereinafter, *Sudarsky et al.*). The Examiner's Answer maintained the rejection of claim 8 under 35 U.S.C. § 103(a) as allegedly being unpatentable over *Greene et al.* in view of *Sudarsky et al.* in further view of U.S. Patent No. 5,600,763 to *Greene et al.* (hereinafter, the '763 patent to avoid confusing the '455 patent to *Greene et al.*).

Appellant will address the arguments asserted in the Response to Argument section of the Examiner's Answer in the order they were submitted.

The Examiner's Answer concerning the argument that there is no suggestion to combine the cited references is an enigma that fails to address the arguments presented in the Appeal Brief in support of the contention that the Patent and Trademark Office has failed to meet its burden for establishing a *prima facie* case of obviousness. The Examiner's Answer acknowledges a statement of the law that recognizes that a *prima facie* case for obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art.

Thereafter, the Examiner's Answer recites multiple clauses before concluding that the rejection in the present instance is proper. More specifically, the Answer recites that both *Greene et al.* and *Sudarsky et al.* show limitations of the claimed invention. The Answer

then alleges that the *Greene et al.* reference alone shows the limitations of the claimed invention. Next, the Answer apparently attempts to present reasons for combining the teachings of *Sudarsky et al.* with the method of *Greene et al.* Appellant has reviewed the various clauses multiple times and is unable to make sense of the argument. For simplicity of analysis, the Examiner's argument in support of the assertion that a *prima facie* case of obviousness has been established is repeated below.

In this case both Greene et al. and Sudarsky show limitations of the claimed invention; Greene's teachings alone show the limitations of the claimed invention, the reasons for using the combination of Sudarsky's teaching into Greene's method to modify the feature of updating the occluded dynamic object during the time period, because in the Sudarsky's reference, the method of using updating z-pyramid has been shown in the background or prior art of the invention (col. 3, lines 56-67) and the method of updating z-pyramid has been improved in updating the potentially visible dynamic object for primitive occlusion testing and rendering or updating the occluded dynamic object during the time period; therefore, the rejection in the present instance is proper.

Appellant submits that neither the above excerpt nor the Final Office Action cites a proper suggestion, teaching, or motivation to modify the teachings of *Greene et al.* in such a way as to disclose the Appellant's claimed invention. Furthermore, the above excerpt fails to address the arguments presented in the Appeal Brief.

Specifically, both *Greene et al.* and *Sudarsky et al.* separately, and in combination (assuming *arguendo* that the combination is proper) fail to teach the claimed invention. In addition, the cited references and knowledge available to those of ordinary skill in the art at the time of the invention, does not teach, suggest or motivate one so skilled to modify the method of *Greene et al.* to achieve the system as recited in the claims of the present application. More specifically, there is nothing to suggest that one skilled in the art would be motivated to modify the hierarchical Z-buffer scan-conversion algorithm that marks rendered (*i.e.*, scan converted) primitives to avoid scan converting them more than once of *Greene et al.*

*al.* to generate a graphics processing system that performs Z pyramid calculations as primitives are being processed. Furthermore, there is no suggestion that the methodology apparently disclosed in *Sudarsky et al.* might be adapted to perform Z pyramid calculations. Moreover, there is no suggestion that the anti-aliasing method in the '763 patent might be adapted to perform Z pyramid calculations as recited in the pending independent claims. Appellant respectfully submits that the preceding arguments remain unaddressed both in the Final Office Action and in the Examiner's Answer.

Simply stated, the clauses of the Examiner's Answer fail to support a *prima facie* case for obviousness under the law. As acknowledged by the Court of Appeals for the Federal Circuit, the U.S. Patent and Trademark Office ("USPTO") has the burden under section 103 to establish a *prima facie* case of obviousness by showing some objective teaching in the prior art or generally available knowledge of one of ordinary skill in the art that would lead that individual to the claimed invention. See *In re Fine*, 837, F.2d 1071, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Absent a proper motivation to combine the cited references, the pending claims are allowable as a matter of law.

It is respectfully asserted that no such *prima facie* case has been made in either the Final Office Action or the Examiner's Answer. In this regard, Appellant has pointed out significant differences between the claimed invention and the cited references and requested that the Examiner identify with specificity the motivation to combine the methodology of *Greene et al.* with the system of *Sudarsky et al.* to reach the presently claimed invention. Throughout the prosecution and in the Answer, the Examiner has wholly failed to recite a clear statement of the motivation to combine absent the allegation that the references show the claimed limitations. Even if portions of the cited references show limitations of the claimed invention as the Examiner's Answer suggests, this is not a sufficient motivation that

permits the proposed combination nor does it render the claimed invention obvious under 35 U.S.C. § 103.

Consequently, for at least the reasons recited above and the reasons recited in the Appeal Brief, Appellant submits that the Examiner's rejection of claims 1, 4-11, and 14-18 is improper. Thus, for at least these reasons, Appellant submits that the Examiner's rejection of the pending claims should be overturned.

In addition to the failure of the cited references to suggest a proper motivation to combine the cited references and forming a separate and distinct reason for patentability of the pending claims, neither *Greene et al.* nor *Sudarsky et al.* discloses, teaches, or suggests, either alone or in combination every element and limitation as recited in the pending claims.

In this regard, the Examiner's Answer fails to address the Appellant's arguments as presented in the Appeal Brief in their entirety. More specifically, the Examiner's Answer addresses only a small portion of the Appellant's argument that neither *Greene et al.* nor *Sudarsky et al.* discloses, teaches, or suggests, every element and limitation as recited in the pending claims. Consequently, Appellant submits that the Examiner's Answer misstates the Appellant's argument as presented in the Appeal Brief.

Significantly, the Examiner's Answer alleges that the Appellant relies upon features that are not recited in the pending independent claims (the z pyramid data can be updated on the fly and can be periodically updated with pixel level z values to ensure accurate occlusion testing, and updating z pyramid to be reconstructed prior to scan conversion). While the Appellant has characterized the invention as permitting the modification of Z pyramid data on the fly (*i.e.*, while the primitives are being processed by the graphics processor prior to scan conversion), Appellant submits that with respect to independent claim 1, neither *Greene et al.* nor *Sudarsky et al.* disclose, teach or suggest, "*wherein if said logic determines that the maximum Z value of the primitive is less than the Z value for the covered subregion, then the Z value for the*

*covered subregion is replaced with the maximum Z value of the primitive.*" as recited in the claim.

Furthermore, with regard to dependent claim 8, Appellant argued that neither *Greene et al.* nor *Sudarsky et al.* nor the '763 patent disclose, teach or suggest, "*. . .the Z pyramid data structure is updated by the tiler component on the fly as primitives are being processed through the graphics system.*"

Moreover, concerning independent claim 11, Appellant argued that neither *Greene et al.* nor *Sudarsky et al.* disclose, teach or suggest, "*if a determination is made that the maximum Z value of the primitive is less than the Z value for the covered subregion, replacing the Z value for the subregion with the maximum Z value of the primitive.*"

Regarding independent claim 18, Appellant argued that neither *Greene et al.* nor *Sudarsky et al.* disclose, teach or suggest, "*wherein if said comparing means determines that the maximum Z value of the primitive is less than the Z value for the covered subregion, then said comparing means replaces the Z value for the subregion with the maximum Z value of the primitive.*"

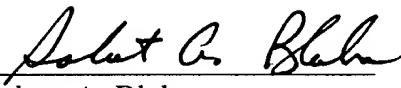
Appellant submits that the emphasized limitations as recited in claims 1, 8, 11, and 18 accurately reflect the features upon which Appellant relies when making the assertion that the cited references fail to teach the invention as claimed.

Consequently, for at least the reasons recited in the Appeal Brief and in this Reply Brief, Appellant submits that the Examiner's rejection of claims 1, 4-11, and 14-18 is improper. Thus, for at least these reasons, Appellant submits that the Examiner's rejection of the pending claims should be overturned.

## CONCLUSION

Appellant respectfully requests that the Board of Appeals reverse the Examiner's rejections of the claims for the reasons indicated in the Appeal Brief and this Reply Brief. In summary, it is the Appellant's position that a *prima facie* case for obviousness has not been made against Appellant's independent claims 1, 11, and 18. In addition, as a result of their dependence from independent claims 1, and 11 a *prima facie* case for obviousness has not been made against Appellant's claims 4 through 10, and 14 through 17, which depend from independent claims 1 and 11, respectively. Therefore, it is respectfully submitted that each of the pending claims 1, 4-10, 11, 14-17, and 18 is allowable over the cited prior art and that the rejection of these claims should be overturned.

Respectfully submitted,

  
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